

Delayed Migration of Gel Mark Ultra Clip Within 15 Days of 11-Gauge Vacuum-Assisted Stereotactic Breast Biopsy

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Interventional breast radiologists commonly deploy metallic clips in the biopsy site after percutaneous vacuum-assisted stereotactic breast biopsy. Cases of delayed clip migration have been reported [1–6] for the MicroMark clip (Ethicon Endo-Surgery) and Gel Mark clip (SenoRx). To my knowledge, I am reporting the first case of delayed migration of the Gel Mark Ultra clip (SenoRx), which occurred within 15 days of initial accurate placement as confirmed by mammographic imaging. Sonogram-guided localization of the bioresorbable pellets enabled accurate surgical excision at the core biopsy site. Radiology–pathology correlation demonstrated that despite delayed migration of the clip, the majority of the pellets stayed near the core biopsy site, providing a reliable landmark for localization.

Consultation with the institutional review board revealed that neither their approval nor informed patient consent was required for this case report.

Case Report

A 62-year-old woman with a history of focal ductal carcinoma in situ treated in the right breast 10 years previously with lumpectomy underwent percutaneous stereotactic-guided core needle biopsy for indeterminate calcifications and associated density at 12 o'clock in the left breast. The left breast biopsy was done in a 90-degree lateral-to-medial approach with an 11-gauge vacuum-assisted biopsy device (Mammotome, Biopsys/Ethicon Endo-Surgery), as the lesion was readily identified in the lateral projection during mammographic workup, but difficult to visualize in the craniocaudal view. No significant bleeding occurred during or immediately after the biopsy. After removal of the bulk of the calcifications during core biopsy, a Gel Mark Ultra clip was deployed into the biopsy cavity.

Postprocedural mediolateral oblique images followed by craniocaudal mammographic images (Fig. 1) confirmed initial accurate clip placement at the biopsy site. Histology showed infiltrating lobular carcinoma and atypical ductal hyperplasia associated with microcalcifications in the core biopsy specimens. The patient was informed of the malignant histology by the interventional breast radiologist 2 days after biopsy and referred for surgical consultation. She reported no pain, bleeding, or swelling at the biopsy site.

The patient returned 15 days after initial stereotactic biopsy for surgical lumpectomy. Using sonographic guidance (HDI 5000 with SonoCT; Advanced Technology Laboratories), the bioresorbable pellets were localized [7] under local anesthesia with a Modified Disposable Kopans Spring Hook Localization Needle (Cook) (Fig. 2). Postprocedural true lateral and craniocaudal mammographic images (Fig. 3) confirmed successful placement of the reinforced segment of the wire in close approximation to the region of the initial biopsy cavity. However, the clip had migrated 4 cm laterally from the biopsy site. After informed consent was obtained from the patient, the clip was successfully localized with a second Modified Disposable Kopans Spring Hook Localization Needle using full-field digital mammographic guidance. Postprocedural craniocaudal and mediolateral oblique full-field digital mammographic images (not shown) confirmed successful placement of the reinforced segment of this second wire adjacent to the clip.

At surgery, the lumpectomy specimen radiograph (Fig. 4) confirmed the presence of the two hookwires and the clip. Carefully directed sectioning by the pathologist showed the malignancy and changes of the recent biopsy site to be in close approximation to the biodegradable pellets. The pathologic section containing the clip did not contain any

Received July 13, 2004; accepted after revision August 26, 2004. Author is current nonpaid member, Scientific Advisory Board, Hologic, and former paid consultant, Ethicon Endo-Surgery.

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0895-1951/05/203-203

DOI: 10.1148/radiol.2005.040713

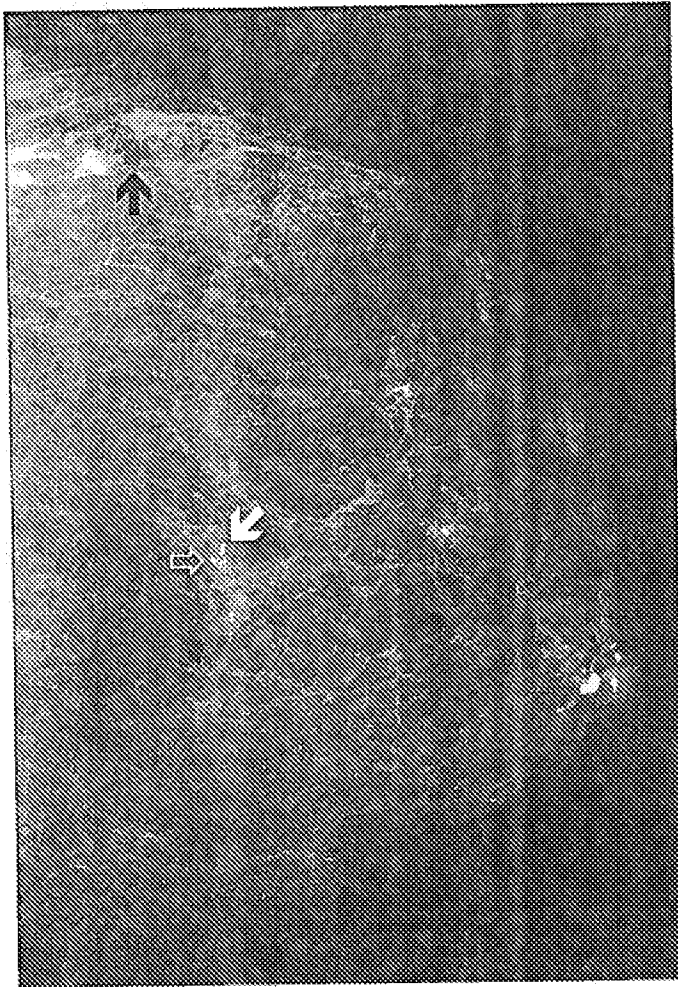


Fig. 1—Immediate postbiopsy craniocaudal film-screen mammogram in 62-year-old woman with previous history of ductal carcinoma in situ in the right breast shows Gel Mark clip (SenoRx) (solid white arrow) within biopsy site, as denoted by adjacent density from small hematoma (hollow white arrow). Air radiolucency (solid black arrow) is noted near stereotactic needle entry site in lateral breast.

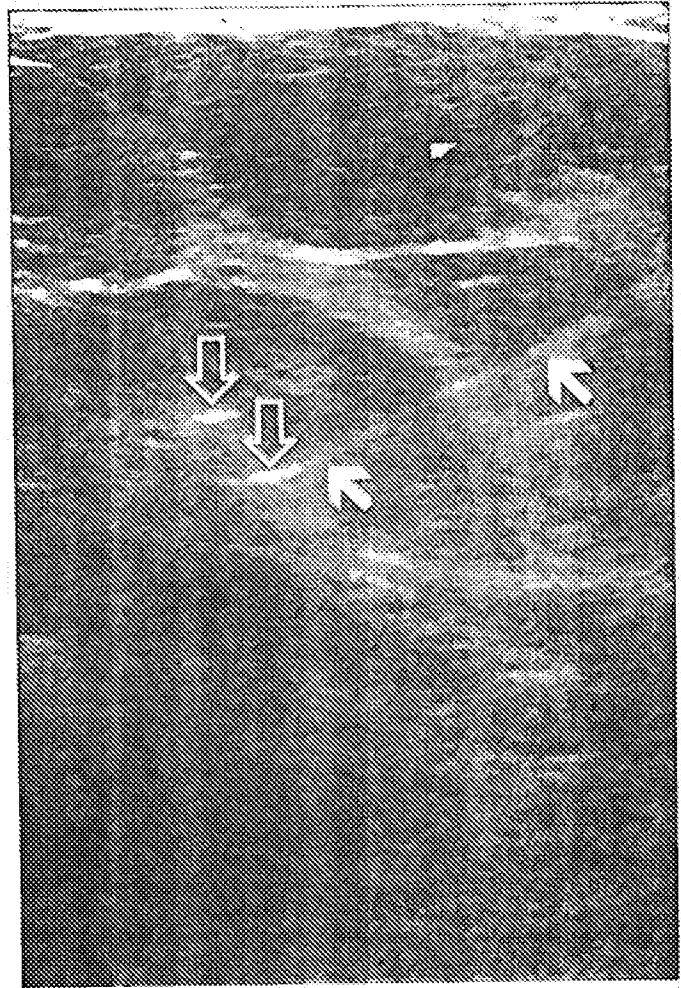


Fig. 2—With sonogram guidance, antiradial real-time compound breast sonogram image of left breast at 12 o'clock position shows needle localization wire (solid white arrows) placed into region of Gel Mark Ultra pellets (Seno Rx) (hollow white arrows) within recent stereotactic biopsy cavity.

features of the recent core biopsy. Surgical specimen histology showed residual malignancy separate from the margin. The patient's postoperative course was uneventful.

Discussion

The Gel Mark Ultra biopsy site marker system (SenoRx) consists of an introducer containing 11 biodegradable cylindric pellets. The pellets consist of a copolymer of polylactic acid and polyglycolic acid, the same basic ingredients of a Vicryl suture (Ethicon Endo-Surgery). One of the pellets contains a stainless steel clip (technical report #2, SenoRx). Immediately after a stereotactic breast biopsy, the introducer system is placed into the biopsy probe, and the pellets are deployed into the biopsy cavity in a slow and steady manner. Em-

bedded within the pellets are carbon dioxide bubbles that make the marker highly echogenic and visible on sonography for at least 4 weeks [8]. This enables sonographically-guided needle localization when necessary after stereotactic breast biopsy [7]. The pellets are ultimately degraded and resorbed, with the permanent metallic clip left behind.

Delayed migration is an increasingly recognized complication of clip placement, and refers to the shift of the marker location after initial correct placement of the marker into the biopsy cavity. At least four cases of delayed migration of the MicroMark clip within 5 weeks [1], 6 weeks [2], 10 months [3] and 1 year [4] of accurate initial placement have been reported. Similarly, delayed migration of the Gel Mark clip within 8 days [5], 15

days [6], and 10 weeks [11] of initial accurate placement has been reported.

To my knowledge, this is the first report of delayed migration of the Gel Mark Ultra clip, which occurred within 15 days of initial accurate placement confirmed by mammographic imaging.

The delayed migration of the Gel Mark Ultra clip in this case was along the axis of the insertion of the biopsy needle (i.e., the Z axis). This has been postulated to occur from the accordion effect [9]. In theory, immediately after the core biopsy, the clip is within the biopsy cavity but does not adhere firmly to the breast tissue. When the breast is released from compression after stereotactic biopsy, the metallic-clip shift from the biopsy site occurs along the trajectory of the biopsy



Fig. 3—Initial preoperative needle localization craniocaudal mammogram shows localization wire to be in region of biopsy cavity; minimal hematoma is present (hol-low arrow). Skin entry site of hookwire is denoted by round metallic BB placed on breast. Gel Mark clip (SenoRx) (solid white arrow) has laterally migrated with respect to biopsy site. Ill-defined density (solid black arrow) is present in mammogram from injected local anesthesia.

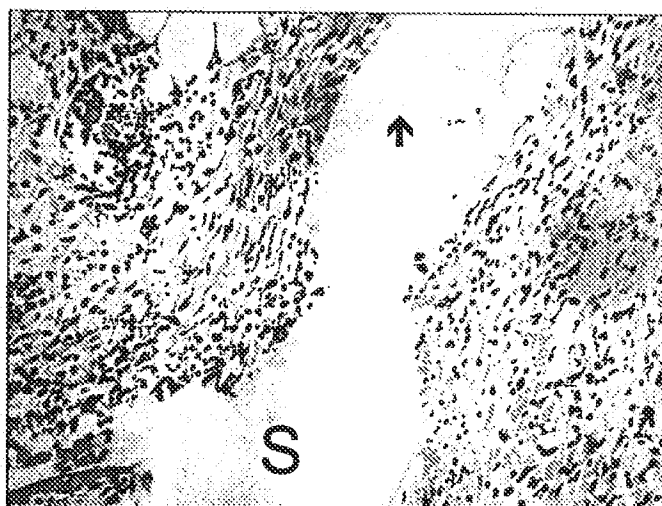
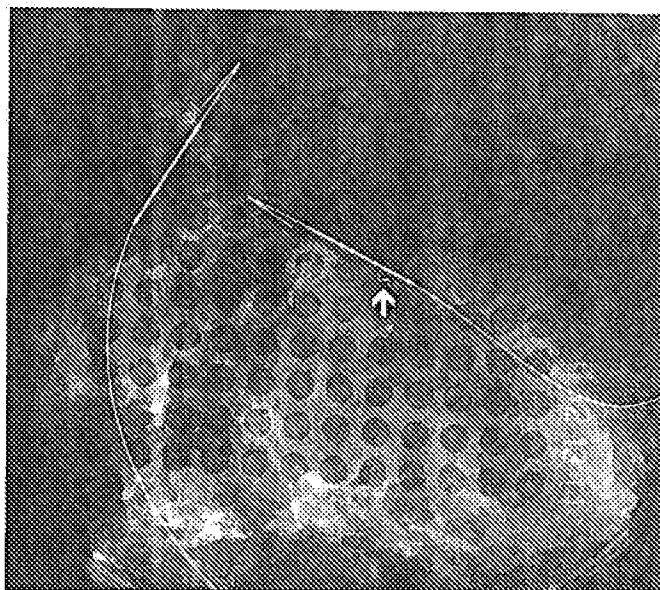


Fig. 4—Mammogram specimen.

A, Photomicrograph of localized clip (solid white arrow) and both hookwires in surgical excision. (H and E, $\times 100$)
B, Translucent material from pellets (solid black arrow) within elongated space (black S) is seen, representative of core needle biopsy cavity surrounded by fibrosis and inflammation. In region of core biopsy site, pattern consistent with infiltrating lobular carcinoma (not shown) was identified. After carefully supervised sectioning by interpreting pathologist, no malignancy was found in region of migrated clip.

needed, presumably the axis of least resistance. Other possible mechanisms of clip migration include simple migration of the clip in fatty tissue, bleeding during or after the procedure displacing the clip, and resorption of peribipopsy air [9].

In this case, preoperative sonographically-guided needle localization of the pellets [7]

enabled successful surgical excision of the core biopsy site and malignancy, despite clip migration. Initial postprocedure mammographic images confirmed the localization hookwire to be adjacent to the biopsy cavity, whereas the clip had migrated 4 cm from the core biopsy site. Radiologic-pathologic correlation demonstrated that the majority of

pellets had stayed within the biopsy cavity, whereas the metallic clip had migrated. Based on this experience, radiologists should consider sonographically-guided localization of the Gel Mark Ultra clip a viable option compared with mammographic guidance. This approach may be especially helpful in the settings of clip mi-

gration and/or mammographic disappearance of the initial lesion after stereotactic core needle biopsy. Further research is needed to assure that the sonographically visible pellets do not migrate.

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